

What is claimed is:

1. A method for producing powder metal articles comprising the steps of:
sintering a compacted powder metal preform having a plurality of teeth; and
forcibly moving the powder metal preform axially through a first die having a tooth form profile with a broadening width region over at least a lead portion of the profile in the direction of axial movement of the preform and engaging and densifying the teeth of the preform.
2. The method of claim 1 including:
guiding the powder metal preform into engagement with the first die with a first spacer having guide teeth extending between the teeth of the preform.
3. The method of claim 2 including:
forming the tooth form profile of the first die along a helix.
4. The method of claim 3 including:
forming the guide teeth of the first spacer along a helix.
5. The method of claim 3 including:
maintaining tip diameters of the teeth of the preform substantially constant during axial movement through the die.
6. The method of claim 3 including:
passing the preform out of the broadening width region and into a narrowing width region defined by the tooth form profile.
7. The method of claim 3 including:
providing a plurality of axially successive spacers and dies, with the respective tooth form profiles of the dies configured to impart progressively increased

densification of the preform teeth.

8. The method of claim 7 including:

aligning the respective tooth form profiles of the plurality of dies and the respective guide teeth of the spacers along a common helical axis corresponding to the helical structure of the teeth of the preform; and

forming the respective tooth form profiles of the plurality of dies successively narrower to impact the progressive densification to the teeth of the preform.

9. An apparatus for densifying helical gear teeth of sintered powder metal gear preforms comprising:

at least one guide member having helical teeth extending in an axial direction of the first guide;

at least one densifying die having helical teeth aligned in axial succession to the helical teeth of said at least one guide member, said helical teeth of said densifying die having a variable width in the axial direction defining a constricted region between adjacent teeth narrower than the space between adjacent helical teeth of the guide member.

10. The apparatus of claim 9 wherein said at least one guide member is further defined as a plurality of guide members and said at least one densifying die is further defined as a plurality of densifying die and said plurality of guide member and said plurality of densifying dies being arranged in axial alternating order.

11. The apparatus of claim 10 wherein respective said constricted regions defined by respective plurality of said densifying dies being progressively smaller to impart progressive densification to the teeth of the preform.

12. The apparatus of claim 9 wherein said at least one densifying

die includes a top surface adjacent said at least one guide member and each of said helical teeth of said at least one densifying die is further defined cooperating with said top surface to define one of round and a chamfer.

13. The apparatus of claim 9 wherein each of said helical teeth of said at least one densifying die defines an axial length and a substantially constant height along said length.

14. The apparatus of claim 13 wherein said constricted portion is substantially centered along said length.

15. A die for producing powder metal articles comprising:
a top surface;
a bottom surface spaced from said top surface;
an aperture having a diameter and extending between said top and bottom surfaces; and
a plurality of grooves extending between extending between said top and bottom surfaces radially outwardly from said aperture wherein each of said plurality of grooves has a length and a variable width along said length.

16. The die of claim 15 wherein each of said grooves defines an hour-glass portion along said length.

17. The die of claim 16 wherein said hour-glass portion is disposed evenly spaced between said top and bottom surfaces.

18. The die of claim 15 wherein said grooves are helical.

19. The die of claim 15 wherein said diameter is substantially constant between said top and bottom surfaces.